PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

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COLUMBIA

Fish Habitat Enhancement Potential And Stocking Assessment Of Dina Lake (#1)

A. R. McLean
1991

PWFWCP Report No. 117

105-02870/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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DINA LAKE #1

WATERSHED: Parsnip River

DATE OF SURVEY: June 8. 9. 1991

FIELD CREW LEADER: A.R. McLean

FIELD ASSISTANT: A.R. Langston

PEACE FISHERIES COMPENSATION PROGRAM

B.C. HYDRO

ENVIRONMENTAL RESOURCES

and

B.C. ENVIRONMENT

FISH AND WILDLIFE BRANCH

REPORT PREPARED BY: A.R. McLean

Lake: **DINA #1**

INTRODUCTION

A standard fisheries baseline reconnaissance of Dina Lake #1 was carried out by the Fish and Wildlife Branch (Prince George) in 1979 and 1983. The reports are on file at the Ministry of Environment, Fish and Wildlife Branch, Prince George.

Dina Lake #1 has been stocked with native rainbow and/or brook trout since 1980 (table 1).

Dina Lake #1 was investigated in June of 1991 by the Peace Fisheries Compensation Program to identify potential fisheries enhancement projects and to determine if changes to the current stocking program are recommended.

STOCKING HISTORY

TABLE 1
DINA LAKE #1 STOCKING HISTORY

Year	Species	Number	Size (grams)	Stage	Stock
1991	rainbow trout	20,000	5.1	yearling	Premier
1991	brook trout	31,235	3.1	fry	Aylmer
1990	rainbow trout	20,000	16.6	yearling	Badger
1989	rainbow trout	20,000	10.2	yearling	Tunkwa
1988	rainbow trout	26,000	11.0	yearling	Tunkwa
1987	rainbow trout	20,000	12.8	yearling	Tunkwa
1981	brook trout	16,000	2.6	fry	Aylmer
1980	brook trout	30,000	3.4	fry	Aylmer

LOCATION

Location: 25 km north northwest of Mackenzie
Elevation: 686 m +/-
Latitude/Longitude: 55°31'35":123°18'30" U.T.M.: 10.4805.61533
Management Unit: 7-30 N.T.S. Map No.: 93-0/11 (edition 2)

Drainage: Internal

Lake: **DINA #1**

METHODS

Two sinking monofilament gill nets (17 and 19 hour sets) and two minnow traps (both 23 hour sets) were set to determine relative abundance and identification of fish species in Dina Lake #1 (See Appendix 1 for net set details) (See figure 1 for net set locations).

Rainbow trout were sampled for length, weight, sex, maturity, stomach contents and parasite/disease presence (Appendix 2). Scale samples were collected for age determination. General appearance of the brook trout was recorded through visual analysis. The total catch and size range of lake chub captured during the investigation was also recorded.

The fisheries enhancement potential of any inlets or outlets was determined through visual observation and recording of physical data, using standard methodologies outlined in the Fish/Habitat Inventory and Information Program (1987 Stream Survey Field Guide).

On site anglers were interviewed opportunistically. Salmonid catch per unit effort information was recorded from these anglers and angling undertaken by program staff.

The benchmark set during the initial study (1983) was located (figure 1). Any change in water level was measured using an eslon tape, in combination with a abney level.

Photo documentation of the investigation was also completed (see figure 1 for photo locations).

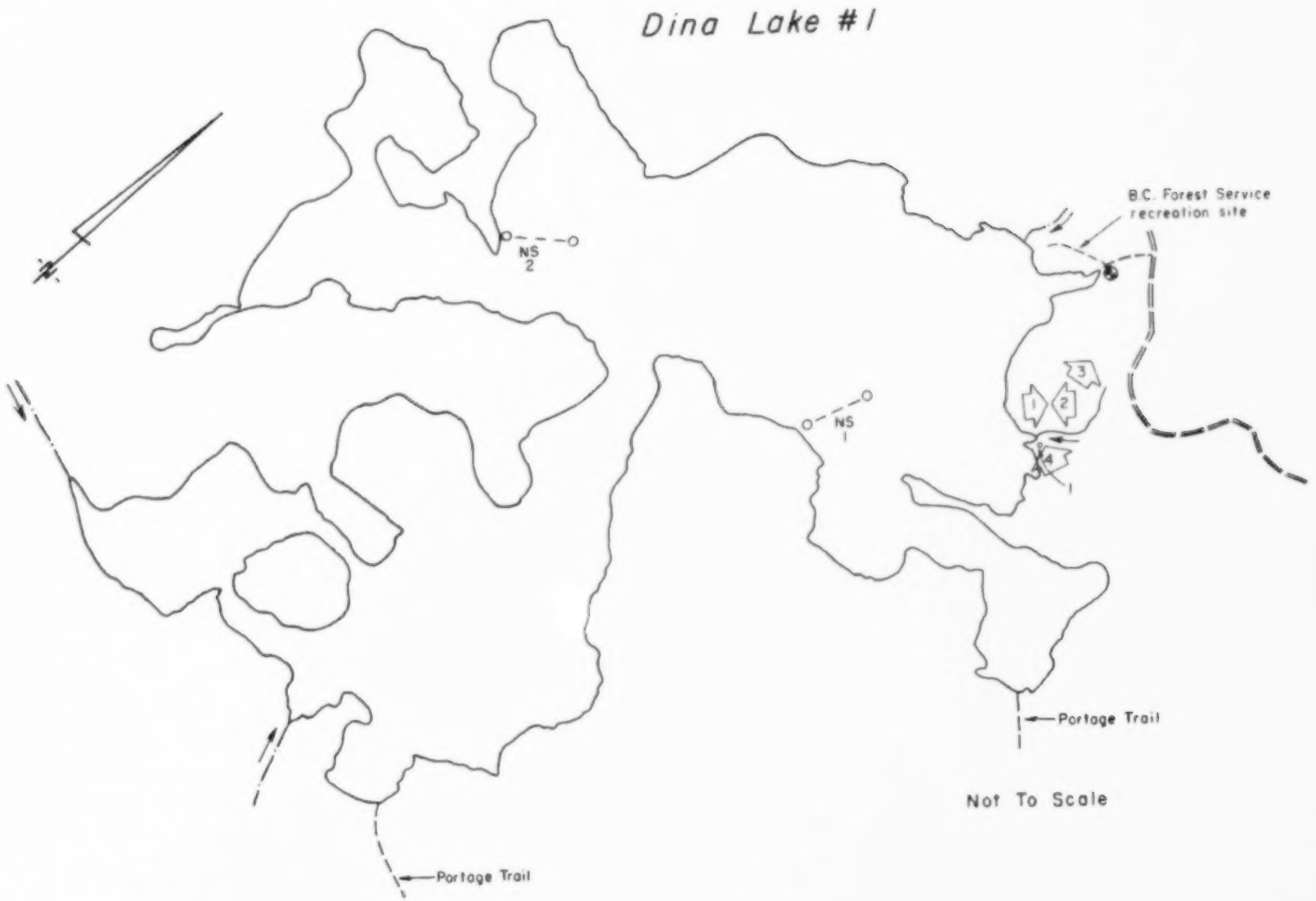
Dina Lake #1
B.C. Forest Service recreation site
NS 2
NS 1
1
2
3
4
Portage Trail
Portage Trail
Not To Scale

Figure 1

Lake: **DINA #1**

RESULTS & DISCUSSIONS

Two overnight net sets produced 89 rainbow trout and 255 longnose sucker (table 2). Two minnow traps yielded 302 redside shiner and 2 longnose sucker (table 3). Average fork length, weight and condition factor was calculated for the captured rainbow trout (table 4).

TABLE 2
LAKE CATCH SUMMARY

Species	Net Site Number				Angled	Other	Total	Number Sampled	Number Preserved	Size Range (cm)
	1	2	3	4						
rainbow trout	20	69	-	-	-	-	89	50	-	12.6 - 58.5
longnose sucker	114	141	-	-	-	-	255		-	11.2- 37.3

TABLE 3
MINNOW TRAP CATCH

#	Hours	Depth (m)	Substrate	Species	Size Range (cm)
1	23.25	0.8	organics	165 redside shiner 1 longnose sucker	4.8 - 9.0
2	23.60	1.0	cobble	137 redside shiner 1 longnose sucker	4.6 - 8.0

Bait: Sardines

TABLE 4
AVERAGE LENGTH, WEIGHT AND CONDITION FACTOR

Rainbow Trout	Fork Length (cm)	Weight (grams)	Condition Factor
Number	50	50	50
Mean	28.3	334.4	1.01
Std	8.7	458.2	0.17
Min	12.6	10	0.49
Max	58.5	2600	1.29
		Condition Factor Formula:	k = (W(grms) x 100)/L(cms)3

Lake: **DINA #1**

Length vs Age

An indication of growth rate is provided through the length/age relationship of the rainbow trout (table 5, figure 2).

TABLE 5
LENGTH/AGE RELATIONSHIP

Species	Age	Sample Size	Mean (cm)	Std Dev.	Min (cm)	Max (cm)
rainbow trout	1	1	12.6	–	12.6	12.6
rainbow trout	2	5	20.8	1.8	18.8	23.6
rainbow trout	3	16	27.6	2.4	23.1	32.2
rainbow trout	4	5	37.2	7.0	26	47.6
rainbow trout	5	2	53	5.5	47.6	58.6

RAINBOW TROUT LENGTH/AGE RELATIONSHIP

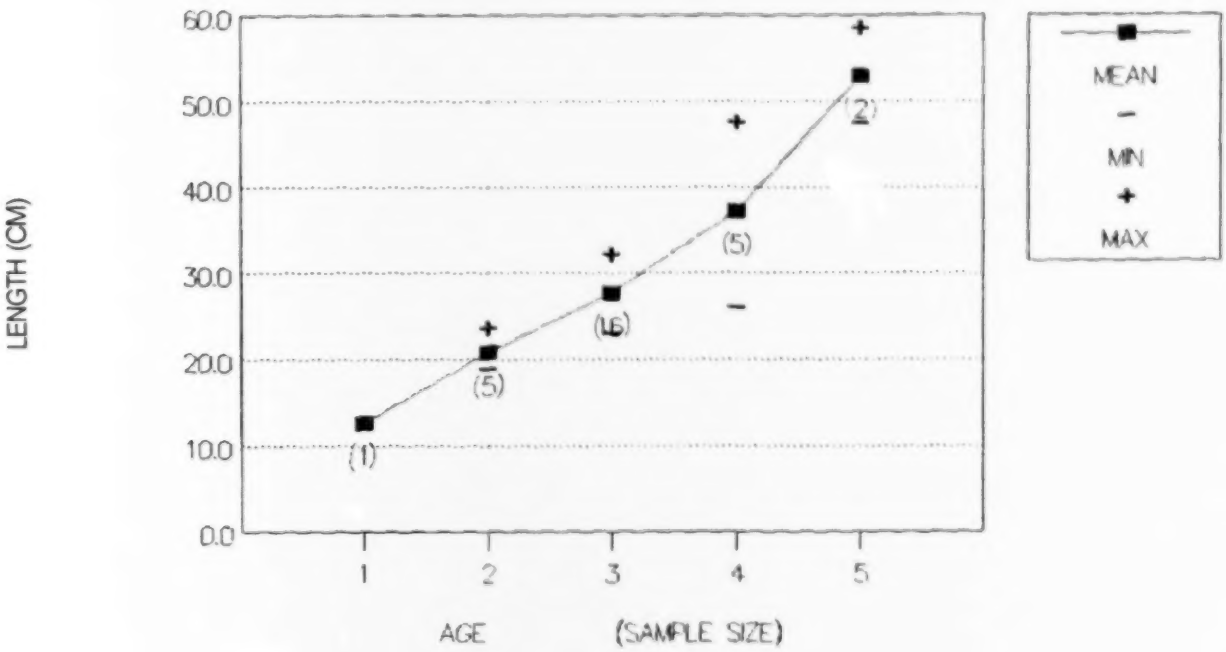

figure 2

Lake: **DINA #1**

Length vs Weight

The proportionate upward trend in the length/weight relationship of the rainbow trout in Dina Lake #1 is shown in figure 3.

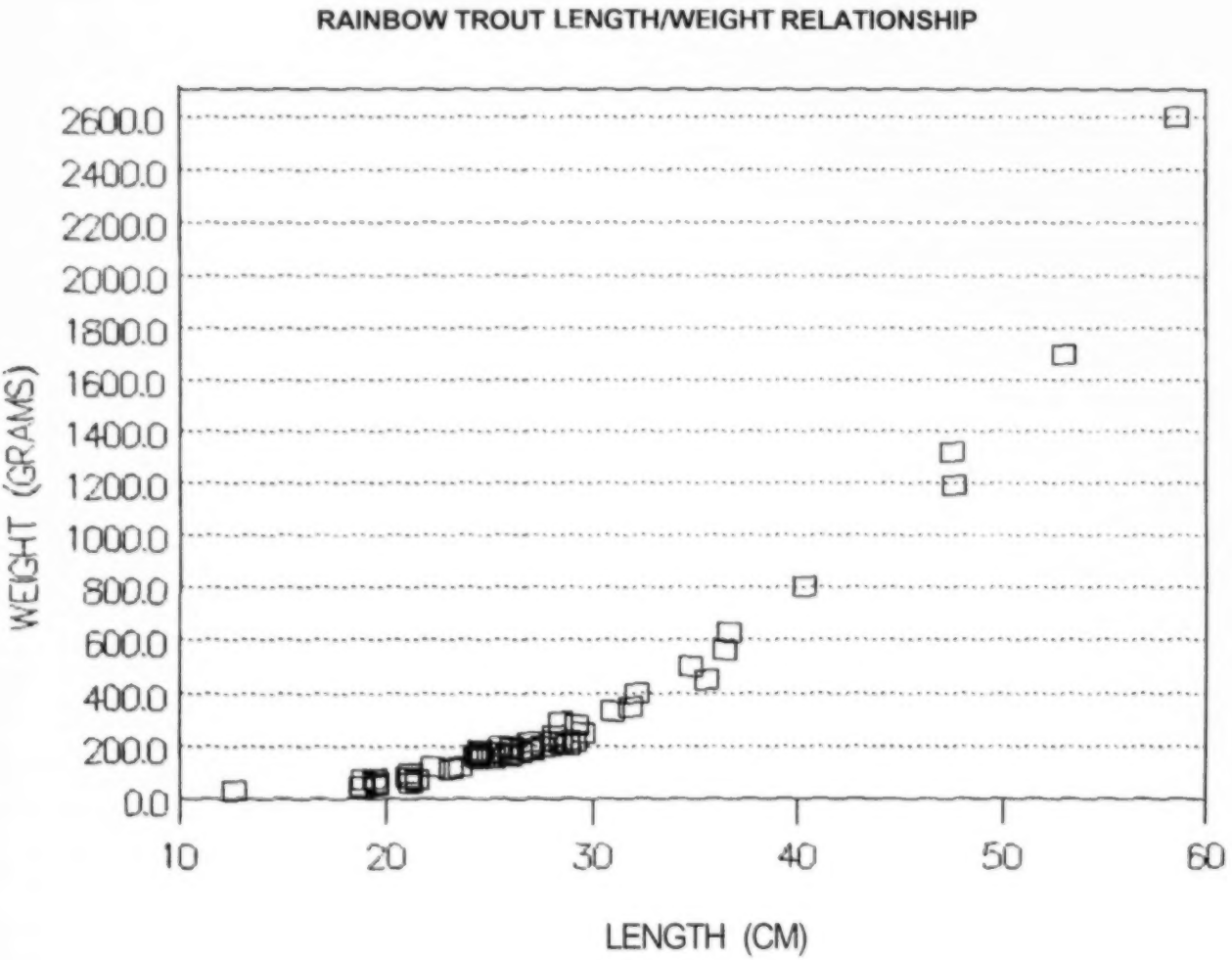

figure 3

Lake: **DINA #1**

BIOLOGICAL ANALYSIS OF RAINBOW TROUT

The rainbow trout sampled during the investigation consisted of 20 males, 27 females and 3 unknown. Reproductive organ analysis of 30 rainbow trout indicated 15 were gravid, 1 was mature, 3 were maturing and 11 were sexually immature. Stomach contents examination of 30 rainbow trout revealed a diet primarily of insects (beetles, mosquitos, dragon flies). Fish and zoo plankton were noted in 2 of the rainbow trout stomachs examined. Tapeworms were also noted in 2 of the examined stomachs. The rainbow trout captured appeared healthy. However, tapeworms and/or tapeworm cysts were observed in the body cavity or on the stomach of 11 specimens. Roundworms were noted in the body cavity of 1 rainbow trout.

DRAINAGE

Unnamed Creeks - Intermittent inlets (2)

Two intermittent creeks flow into the south basin and one intermittent creek flows into the north basin of Dina Lake #1. These inlets offer no fisheries value.

Unnamed C. - Inlet #1

Inlet #1 flows 830 m from Dina Lake #2 into the north basin of Dina Lake #1. The first beaver dam (0.6 m in height by 40 m in length) on the inlet is located at lake's edge. The resulting pond is 17 m in length by 11 m in width. A second dam (1.3 m in height by 50 m in length) is located 17m upstream from the lake. The resulting pond is 35 m in length by 30 m in width. Seepage from the second dam has created a small channel which drains into the lake. The channel has a complete organic substrate (100+ rainbow trout were observed in this channel and on the banks). A third dam is located 52 m upstream from the lake. It's pond is 23 m in length by 10 m in width. A fourth dam is located 75 m upstream of the lake. It's pond is 35 m in length and 8 m in width. A fifth dam is located 105 m upstream of the lake. The pond is 30 m in length by 6 m in width. The initial 105 m of the inlet has a complete organic substrate affording no salmonid spawning habitat, but good rearing habitat. The above mentioned dams are obstructions to upstream fish passage. Approximately 175 m upstream from the lake, the average wetted width was 2.5 m, average depth was 10 cm, gradient was 1.5% and water temperature was 12°C. The creek has moderate spawning and rearing habitat upstream of the beaver dams.

Lake: **DINA #1**

Plate 1: Upstream view of a typical beaver dam on the inlet #1. This dam (1.0 m in length by 20 m in width) is a barrier to upstream fish passage.

Plate 2: Downstream view of a typical beaver dam pond on inlet #1.

Lake: **DINA #1**

Plate #3: View upstream of inlet #1, taken approximately 350 m upstream of the lake.

Lake: **DINA #1**

ANGLER USE AND CATCH PER UNIT EFFORT

Anglers interviewed on site indicated a poor catch success rate on the lake in spring. One local person fishing for 2 hours caught 2 rainbow trout.

BENCHMARK

The original benchmark set in 1983 was located. It was initially set 2.0 m above the water level. The benchmark is now 1.90 m above the current water level. A 10 cm rise in lake level is apparent.

MISCELLANEOUS COMMENTS

A management plan encompassing all the Dina Lakes has been produced by D.A. Jesson, B.C. Environment, Prince George.

An "engine power restriction" (7.5 kw) has been submitted by B.C. Environment (Prince George) for Dina Lake #1.

A black bear was observed near inlet #1.

Approximately 100 brook trout were observed in the first beaver pond on inlet #1. These fish are believed to have originated from Dina Lake #2, or are progeny of brook trout now residing in the stream.

RESORTS AND CAMPSITES

The recreation site (B.C. Forest Service) at lakes edge is classified as a high use site, with 2168 user days in 1991 (Pers. Comm., J. Ladds, B.C. Forest Service). The site is complete with firepits, outhouses and picnic tables.

Lake: **DINA #1**

FISHERIES MANAGEMENT COMMENTS

Dina Lake #1 supports a population of rainbow trout (stocked), brook trout (stocked), mountain whitefish (only 1 captured) and coarse fish (redside shiner, longnose sucker). The rainbow trout captured during the investigation have a healthy appearance, and appear to be in good condition (C.F. 1.01 (0.5-1.3)). Stomach content analysis revealed a diet of mainly insects, however fish were noted in two of the examined stomachs. Inlet #1 drains approximately 830 m from Dina Lake #2 into Dina Lake #1. It has moderate spawning and rearing habitat. However, beaver dams have effectively blocked access to the available spawning habitat, resulting in a spawnbound condition in the rainbow trout population.

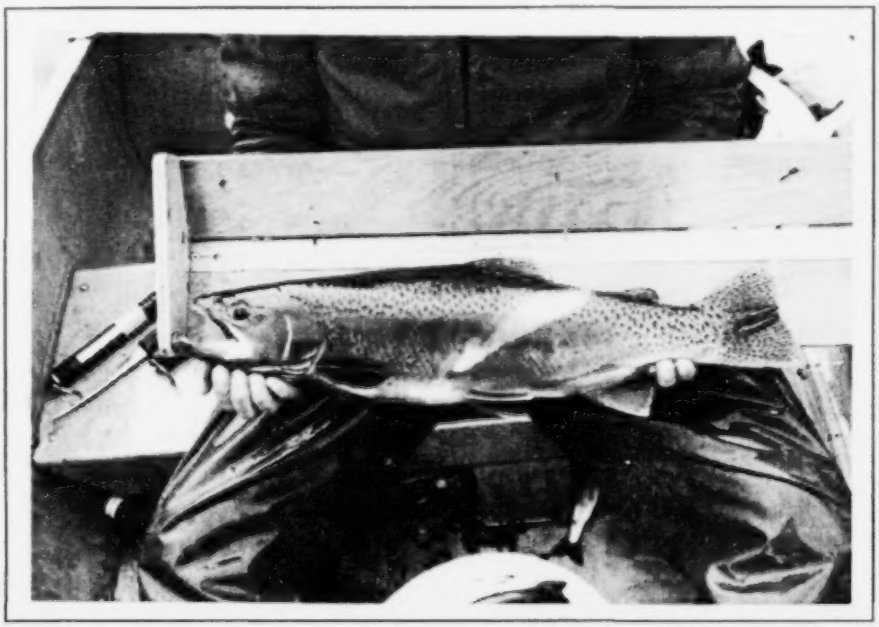

Plate #4: Rainbow trout (2.6 kg) netted during the investigation.

Large size rainbow trout are present in this lake (Plate #4). A total of 20,000 rainbow trout and 31,235 brook trout were stocked in 1991. Anglers interviewed on site indicated a poor catch success rate on the lake in spring.

Lake: **DINA #1**

One local angler fishing for two hours caught two rainbow trout. A B.C. Forest Service Recreation Site is located at lake's edge. Limited expansion of the Recreation Site would not adversely affect the fishery on Dina Lake #1.

Stocking Program

The stocking program appears to be successful, however thorough recommendations with regard to this cannot be made until total angler use and C.P.U.E. is assessed. Stocking Dina Lake #1 with the same density, frequency and strain of fish per year is recommended until 1995. This would facilitate improved stocking program recommendations. A stocking program evaluation is recommended in 1995. Stocking adjustments may have to be considered when the inlet enhancements provide natural recruitment to the lake.

Enhancement Potential

The following inlet enhancements were identified and will be implemented during the 1992 and 1993 field seasons. The work will be carried out by the Peace Fisheries Compensation Program in conjunction with the Mackenzie Fish and Game Association.

Phase 1 - 1992

(1) Beaver dam breaching
(2) Coarse fish barrier construction
(3) Silt and sand removal from existing spawning gravel
(4) Habitat complexing

Phase 2 - 1993

(1) Spawning gravel addition and cleaning
(2) Habitat complexing
(3) Channelling, rip-rap additions
(4) Coarse fish barrier modifications/improvements
(5) Interpretive trail construction

Lake: **DINA** #1

APPENDIX 1

Lake: **DINA #1**

NETTING RECORD

Number of panels: 6
Individual panel length: 15.2 m
Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament		
Date Set:	June 8, 1991	Time:	1740 hrs
Date Lifted:	June 9, 1991	Time:	1100 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1.0 m fines/cobble
Deep End Mesh Size:	76 mm	Depth: Substrate:	2.0 m organics

NETTING SITE #2

Type:	Sinking monofilament		
Date Set:	June 8, 1991	Time:	1750 hrs
Date Lifted:	June 9, 1991	Time:	1320 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1.0 m fines
Deep End Mesh Size:	76 mm	Depth: Substrate:	9.5 m organics

Lake: DINA #1

APPENDIX 2

Lake: **DINA #1**

INDIVIDUAL FISH DATA

Date Captured: June 9, 1991

Method of Capture: sinking monofilament gillnet

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG Egg
FR Fin Ray
HD Head
ML Milt
OT Otolith

SC - Scale
ST - Stomach
TG - Fish Tag
WF - Whole Fish

Species	Fork Lgth. (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr.)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
rainbow trout	12.6	10	?	IMM	SC	1+					
rainbow trout	18.8	45	F	IMM	SC	2+		beetle mosquito			
rainbow trout	18.9	70	M	IMM	SC	2+		beetles mosquitos			
rainbow trout	21.0	80	M	IMM	SC	2+		beetles		trout egg	
rainbow trout	21.5	70	M	IMM	SC	2+	zoo plankton	beetles			tapeworms in body cavity
rainbow trout	23.1	110	F	GV	SC	3					
rainbow trout	23.6	120	M	IMM	SC	2+	zoo plankton	beetles	unidentified fish		tapeworms in body cavity
rainbow trout	24.5	170	F	GV	SC	3				tapeworm	
rainbow trout	25.2	150	F	GV	SC	3+				detritus	
rainbow trout	25.9	160	F	GV	SC	3+		unidentified insects			tapeworms in body cavity
rainbow trout	26.0	200	F	GV	SC	4					found worms in body cavity
rainbow trout	26.0	170	F	IMM	SC	3+		beetles horsefly		wood	tapeworm cysts on stomach
rainbow trout	26.5	170	F	IMM	SC	3+			unidentified fish		tapeworms in body cavity
rainbow trout	26.9	190	F	IMM	SC	3+		unidentified insects		unidentified material	
rainbow trout	27.0	165	F	GV	SC	3+				1 leach	
rainbow trout	27.6	200	M	MT	SC	3					tapeworms in body cavity
rainbow trout	28.1	240	M	IMM	SC	3+				unidentified material	tapeworms in body cavity
rainbow trout	28.5	290	F	MG	SC	3+		beetle dragonfly		detritus	tapeworm cysts in body cavity
rainbow trout	29.1	220	M	GV	SC	3+		dragon fly			
rainbow trout	29.2	280	F	MG	SC	3+			3 trout species unknown	1 leach	
rainbow trout	29.5	260	F	IMM	SC	3+		beetles			
rainbow trout	31.8	345	F	GV	SC	3+					
rainbow trout	32.2	400	F	GV	SC	3+					
rainbow trout	36.6	460	M	MG	SC	4+					tapeworms on internal organs
rainbow trout	36.4	560	F	GV	SC	4				tapeworms	tapeworm cysts in body cavity
rainbow trout	40.3	800	F	GV	SC	4					
rainbow trout	47.5	1,320	M	GV	SC	5					tapeworm cysts in body cavity
rainbow trout	47.6	1,190	M	GV	SC	4					
rainbow trout	63.0	1,700	M	GV	SC						scale resorbed, not readable
rainbow trout	58.6	2,600	M	GV	SC	5					tapeworm cysts in body cavity

AGE DETERMINATION COMPLETED BY:
Margaret MacDonald, Box 243, Midway, B.C.

AGE DETERMINATION VERIFIED BY:
Arne Langston, Peace Fisheries Compensation Program, Prince George, B.C.

Lake: **DINA** #1

INDIVIDUAL FISH DATA

Date Captured: June 9, 1991

Method of Capture: sinking monofilament gillnet

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
FR - Fin Ray
HD - Head
ML - Milt
OT - Otolith

SC - Scale
ST - Stomach
TG - Fish Tag
WF - Whole Fish

Species	Fork Lgth (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
rainbow trout	19.4	75	?								
rainbow trout	19.5	60	F								
rainbow trout	19.5	50	M								
rainbow trout	21.1	95	M								
rainbow trout	21.2	60	F								
rainbow trout	22.2	120	F								
rainbow trout	24.3	160	F								
rainbow trout	24.4	150	M								
rainbow trout	24.5	180	F								
rainbow trout	24.6	150	M								
rainbow trout	25.0	170	F								
rainbow trout	25.5	200	M								
rainbow trout	26.1	190	F								
rainbow trout	26.9	215	F								
rainbow trout	28.1	220	M								
rainbow trout	28.5	215	?								
rainbow trout	28.8	205	M								
rainbow trout	31.0	330	M								
rainbow trout	34.8	500	F								
rainbow trout	36.6	630	F								